PROC. ENTOMOL. SOC. WASH.
104(1), 2002, pp. 164–167

COMPARATIVE ECOLOGY OF THE GENUS *LECONTELLA* WOLCOTT AND CHAPIN (COLEOPTERA: CLERIDAE: TILLINAE), WITH NOTES ON CHEMICALLY DEFENDED SPECIES OF THE BEETLE FAMILY CLERIDAE

JONATHAN R. MAWDSLEY

Department of Entomology, National Museum of Natural History, Smithsonian Institution, Washington, DC 20560-0187, U.S.A. (e-mail: mawdsley.jonathan@nmnh.si.edu)

Abstract.—The genus *Lecontella* Wolcott and Chapin currently contains two species, *L. brunnea* (Spinola) from eastern North America and *L. gnara* Wolcott from southwestern North America. The results of the author's laboratory and field studies of *L. gnara* Wolcott are summarized, and this species' biology compared to that of *L. brunnea.* Larvae of *L. brunnea* are parasites in nests of solitary bees and wasps (Hymenoptera: Eumenidae, Sphecidae, and Megachilidae); adults have been collected at lights at night. The larva of *L. gnara,* which preys on immature stages of Cerambycidae and Buprestidae (Coleoptera), was described and illustrated by earlier workers under the name *Cymatodera morosa.* Adults of *L. gnara* are commonly collected at lights at night and have been reared from *Quercus arizonica* Sargent, *Prosopis* sp., and *Juglans* sp. Adult feeding, antennal grooming, and copulatory behaviors are described for *L. gnara,* and the presence of a chemical defense in adults of this species is noted for the first time.

Key Words: Cleridae, *Lecontella,* chemical defense, ecology, larvae, behavior

The genus *Lecontella* Wolcott and Chapin (1918) currently contains two species, *L. brunnea* (Spinola) and *L. gnara* Wolcott, both of which are large, nondescript, brown tilline clerids. *Lecontella brunnea* is widely distributed throughout eastern North America, while *L. gnara* is found in deserts of the southwestern United States and México. Despite the small size of this genus, its taxonomic history is quite complex, and for those interested in the details a review was provided by Ekis (1975). The taxonomy of *Lecontella* and its relatives is actively being studied by W. F. Barr (in litt.), and additions to this genus are expected in the near future.

In contrast to the wealth of taxonomic writings on the genus *Lecontella,* little has been published on the ecology of its species. The present paper includes substantial new information on the ecology of both species currently classified in *Lecontella.*

SEPARATING SPECIES OF *LECONTELLA*

The two species currently placed in *Lecontella* can be readily separated from species in most genera of Tillinae by the elongate, slender form of the terminal antennomere and the presence of rows of large elytral punctures that continue until the elytral apices. The sympatric genus with which *Lecontella* shows greatest affinity (and with which its species are most often confused in collections) is *Cymatodera* Gray, a large New World genus that has been the subject of considerable careful study by W. F. Barr for the past fifty years. The combination of antennal form and elytral punctures will separate *L. gnara* and *L. brunnea* from sympatric species of *Cymatodera.*

Characters for separating the two currently recognized species of *Lecontella* were discussed by Wolcott (1927). Of the characters listed by Wolcott, I have found the relative size of the pronotal punctures (large and dense in *L. gnara,* small and sparser in *L. brunnea*) to be the most reliable feature for separating adult specimens of these two species. Further information on the identification and relationships of *Lecontella* species will be provided by W. F. Barr in a forthcoming paper.

Ecology of *Lecontella brunnea* (Spinola)

References.—Rau (1944); Bitner (1972); Foster and Barr (1972).

Larva.—Larvae of *L. brunnea* are parasites in the nests of solitary bees and wasps in the families Eumenidae, Megachilidae, and Sphecidae. Bitner (1972) found larvae of *L. brunnea* in nests of the following species of Hymenoptera in Indiana, USA: Eumenidae: *Monobia quadridens* (L.); Megachilidae: *Megachile* sp., *Osmia coerulescens* (L.), *Osmia lignaria* Say; Sphecidae: *Isodontia auripes* (Fernald), *Trypargilum clavatum* (Say), *Trypargilum striatum* (Provancher).

Adult habits.—Labels accompanying adult specimens of *L. brunnea* in NMNH indicate that adults are most frequently collected at lights at night. Adults also have either been reared from or found dead in the nests of bees and wasps. Rau (1944) reported finding adults of this species in the cells of nests of the mud-dauber wasp *Sceliphron caementarium* (Drury) (Hymenoptera: Sphecidae). Foster and Barr (1972) noted that R. M. Bitner successfully reared adults of *L. brunnea* from nests of *Osmia lignaria, O. coerulescens, Megachile rotundata* (F.), *Monobia quadridens,* and *Trypargilum striatum.* Adult specimens in NMNH were reared from an abandoned *Polistes* nest (Hymenoptera: Vespidae), nest of *Megachile rotundata,* nest of *Trypoxylon striatum,* and a "mud dauber nest." The rearing record from an abandoned *Polistes* nest probably indicates parasitism of a megachilid bee species, as megachilids commonly reuse cells of abandoned *Polistes* nests.

Ecology of *Lecontella gnara* Wolcott

References.—Böving and Champlain (1920) (as *Cymatodera morosa* LeConte).

Larva.—The mature larva of this species was described by Böving and Champlain (1921) under the name *Cymatodera morosa* LeConte. This larva was found in dead branches of *Quercus arizonica* Sargent infested by species of Cerambycidae and Buprestidae (Coleoptera); the adult reared from this larva (in NMNH) is unquestionably the species now known as *L. gnara* Wolcott. Rearing records in NMNH indicate that larvae of *L. gnara* are also found in *Prosopis* and *Juglans* spp. infested by buprestid and cerambycid beetles.

Adult habits.—This species is one of the most frequently encountered clerids at lights at night in deserts of southwestern North America. In my experience, adults of *L. gnara* are most abundant at lights on overcast, humid nights preceding summer "monsoon" thunderstorms. Adult specimens in NMNH were reared from *Quercus arizonica, Prosopis* sp., and *Juglans* sp.

Live material studied.—Eleven adult *L. gnara* collected at ultraviolet lights at night in Vail, Arizona, between 7 and 14 September, 1999, were kept alive for laboratory studies.

Adult feeding behavior.—Adults in captivity feed readily on small beetles of a wide range of families. Prey items are captured and manipulated using the first two pairs of legs. The mandibles are used to remove the legs of the prey, which are discarded. The mandibles then serve to nearly divide the prey's body in two at the junction of the prothorax and the mesothorax. Contents of the prothorax and head are consumed, and the prothorax and attached head is discarded. Contents of the mesothorax, metathorax, and abdomen are consumed last. Often the elytra and metathoracic wings are removed to reach the metathorax

and abdomen. In Arizona, the bostrichid beetle *Dendrobiella aspera* (LeConte) (Coleoptera: Bostrichidae) was especially preferred, but beetles of the families Buprestidae, Cerambycidae, Dermestidae, Mordellidae, and Scraptiidae were also consumed. In the laboratory in New York, adults fed on small beetles of the families Buprestidae and Dermestidae, and also readily imbibed sweet syrupy liquids such as honey and maple syrup. Wolcott (1921) noted that species of the related genus *Cymatodera* were found on mesquite imbibing sap flowing from wounds. Given the fact that adults of *L. gnara* readily consumed sweet syrupy liquids in captivity, it is probable that adults of this species also feed on sap flowing from wounds on mesquite and other desert shrubs.

Antennal grooming behavior.—Adults clean their antennae in the same manner as species of *Cymatodera* (*C. bicolor* (Say), *C. hurdi* Barr, *C. inornata* (Say), *C. sobara* Barr, and *C. undulata* (Say)) studied by the author. Oral secretions are transferred to the ventral pads of one of the protarsi; that protarsus steps on the middle of the antenna on the same side of the body, pinning it to the substrate; and the head is moved in the opposite direction, pulling the antenna through. To clean the base of the antennae, the protarsus is rubbed along the basal half of the antenna beginning at the base of the scape.

Reproductive behavior.—Three male and female pairs of *L. gnara* were placed in separate containers. Repeated short (<1 minute) copulations were observed; as in most clerids, the male mounts the female from behind and the male's ventral surface is kept in proximity to the female's dorsal surface throughout copulation. Several likely oviposition substrates were presented to female *L. gnara* after copulation, including dead branches of *Prosopis* and *Quercus* spp. However, no oviposition was observed, and no first instar larvae were obtained, indicating that the conditions necessary for oviposition in this species were not met in the laboratory.

Chemical defense.—Adults of *L. gnara* emit a foul-smelling odor when handled. This odor was not emitted by adult beetles at rest and seems to be associated with disturbance. The odor is similar in smell to the defensive secretions of certain stink bugs (Hemiptera: Pentatomidae) and ladybird beetles (Coleoptera: Coccinellidae) from eastern North America, and undoubtedly could be used as a chemical defense against predation.

Chemical Defenses in Cleridae

The first report of a chemical defense in any species of Cleridae was provided by Marshall and Poulton (1902) in their classic study of the bionomics of South African mimetic insects. Marshall and Poulton (1902) reported that a bright orange clerid species (subsequently identified by Mawdsley (1994b) as *Aphelochroa fulva* Quedenfeldt, subfamily Clerinae) emitted a strong, "verbena-like" smell. Hawkeswood (1987) provided the second example of possible chemical defense in Cleridae, noting that Australian species of the genus *Eunatalis* (again, subfamily Clerinae) emitted strongly-smelling chemicals when handled. *Lecontella gnara* is the first clerid in the subfamily Tillinae identified as possessing a chemical defense, suggesting that chemical defenses may be more widespread in this family than previously thought.

The possible existence of chemical defenses against predation in adult beetles of the family Cleridae is of particular interest given the large numbers of clerid species that mimic venomous or chemically defended insects (Mawdsley 1994a). It is quite possible that many of these mimetic clerids are themselves chemically defended, and that the mimetic interactions in which these clerids participate are Müllerian, rather than Batesian.

Acknowledgments

Funding for travel associated with this project was provided by a grant from the

Theodore Roosevelt Memorial Fund of the American Museum of Natural History, New York. Corinne M. Carter and William and Mary Webber are to be thanked for their valuable assistance with the fieldwork portion of this project. Natalia J. Vandenberg of the USDA Systematic Entomology Laboratory graciously permitted access to collections of adult and larval *Lecontella* specimens in the National Museum of Natural History, Smithsonian Institution (NMNH). The author was supported by a Smithsonian Institution Postdoctoral Research Fellowship, sponsored by Terry L. Erwin. William F. Barr provided helpful comments and suggestions on earlier drafts of the manuscript.

Literature Cited

Bitner, R. M. 1972. Predation by the larvae of *Lecontella cancellata* (LeConte) (Coleoptera: Cleridae) on seven species of aculeate Hymenoptera. Entomological News 83: 23–26.

Böving, A. G. and A. B. Champlain. 1921. Larvae of North American beetles of the family Cleridae. Proceedings of the United States National Museum 57: 575–649 + pls. 42–53.

Ekis, G. 1975. Taxonomic and nomenclatural status of clerid taxa described by Massimiliano Spinola (1780–1857) (Coleoptera: Cleridae). Bollettino Museo Torino 1: 1–80.

Foster, D. E. and W. F. Barr. 1972. Notes on the distribution and bionomics of some North American Cleridae. Journal of the Kansas Entomological Society 45(1): 122–125.

Hawkeswood, T. 1987. Beetles of Australia. Angus and Robertson, North Ryde, N. S. W. viii + 248 pp.

Marshall, G. A. K. and E. B. Poulton. 1902. Five years' observations and experiments (1896–1901) on the bionomics of South African insects, chiefly directed to the investigations of mimicry and warning colours. Transactions of the Entomological Society of London 1902(3): 287–584 + 15 pls.

Mawdsley, J. R. 1994a. Mimicry in Cleridae (Coleoptera). Coleopterists Bulletin 48(2): 115–125.

———. 1994b. A revision of the genus *Aphelochroa* Quedenfeldt (Coleoptera: Cleridae: Clerinae). Journal of African Zoology 108: 121–132.

Rau, P. 1944. A note on *Lecontella cancellata* LeConte (Coleoptera: Cleridae) in cells of the mud-daubing wasp. Entomological News 55(8): 197.

Wolcott, A. B. 1921. North American predaceous beetles of the tribe Tillini in the United States National Museum. Proceedings of the United States National Museum 59: 269–290 + pl. 43.

———. 1927. Descriptions of a new genus and four new species of American Cleridae. Coleopterological Contributions 1(1): 105–110.

Wolcott, A. B. and E. A. Chapin. 1918. Notes on Cleridae. Bulletin of the Brooklyn Entomological Society 13: 107–108.